

What is claimed is:

1. An analog-to-digital converter assembly, comprising:
a noise shaper that preprocesses an analog input signal according to an analog feedback signal and an associated transfer function;
a quantizer that converts the preprocessed analog input signal into a digital output signal;
a delta-sigma modulator that quantizes the digital output signal to produce a digital feedback signal; and
a digital-to-analog converter that converts the digital feedback signal into an analog signal to provide the analog feedback signal.
2. The assembly of claim 1, further comprising a frequency control that alters at least one frequency characteristic of at least one low-noise frequency band associated with the analog-to-digital converter.
3. The assembly of claim 2, the frequency control being operatively connected to the noise shaper and the delta-sigma modulator and operative to alter respective bandwidths associated with the at least one low-noise frequency band.
4. The assembly of claim 2, the frequency control being operatively connected to the quantizer and the digital-to-analog converter and operative to alter respective center frequencies associated with the at least one low-noise frequency band.
5. The assembly of claim 1, the noise shaper comprising a filter that attenuates noise introduced by the analog feedback signal.
6. The assembly of claim 5, the filter comprising a tunable filter.

7. The assembly of claim 6, the tunable filter comprising at least one micromechanical structure that can be electrically configured to change the center frequency of at least one passband associated with the filter.

8. The assembly of claim 1, the delta-sigma modulator comprising a quantizer that reduces a N-bit input into an M-bit output, where N is an integer greater than 1, and M is a positive integer less than N.

9. The assembly of claim 8, the delta-sigma modulator comprising a quantizer that reduces an N-bit input into an 1-bit output

10. The assembly of claim 1, the digital-to-analog converter comprising a single-bit digital to analog converter.

11. A method of providing an analog feedback signal in a multi-bit delta-sigma analog-to-digital converter, comprising:

generating a first digital signal, having a first word-size, from an analog input signal;

preprocessing the first digital signal to shift quantization noise associated with the signal away from at least one frequency band of interest;

quantizing the preprocessed first digital signal into a second digital signal having a second word-size, the first word-size being larger than the second word-size; and

converting the second digital signal into an analog signal to provide the analog feedback signal.

12. A method as set forth in claim 11, the generation of a digital signal comprising:

preprocessing the analog input signal to shift quantization noise associated with the analog-to-digital converter according to the analog feedback signal; and

quantizing the preprocessed analog signal to produce the first digital signal.

13. A method as set forth in claim 12, the generation of a digital signal further comprising filtering the preprocessed analog signal to attenuate quantization noise associated with the analog feedback signal.

14. A method as set forth in claim 11, the second word-size being one-bit.

15. A method as set forth in claim 11, the method further comprising changing at least one frequency characteristic of the at least one frequency band of interest.

16. A system for providing feedback within a delta-sigma analog-to-digital converter, comprising:

means for generating an N-bit digital feedback signal, where N is an integer greater than one;

means for quantizing the N-bit digital feedback signal to produce an M-bit signal, where M is a positive integer less than N;

means for attenuating quantization noise associated with the means for quantizing within a frequency band of interest; and

means for converting the quantized signal into an analog feedback signal.

17. A system as set forth in claim 16, further comprising means for altering at least one frequency characteristic of the means for generating.

18. A system as set forth in claim 16, the means for quantizing including means for producing a one-bit digital signal from the N-bit digital feedback signal.

19. A system as set forth in claim 16, the means for generating a digital signal comprising means for quantizing an analog input signal and means for attenuating quantization noise associated with the means for quantizing an analog signal within a frequency band of interest.

20. A system as set forth in claim 19, the means for generating comprising means for attenuating noise associated with the analog feedback signal.